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Attorney's Docket No.: 35140.002

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**In the Application of:**

Bart D. Hibbs, *et al.*

Group Art Unit No.: 2834

Examiner: Julio C. Gonzalez

Telephone: (703) 308-1047

**Serial No.:** 09/928,038

**Filing Date:** 08/09/2001

**For the Invention of:**

Method of and Apparatus for  
Wave Energy Conversion Using  
A Float with Excess Buoyancy

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**ALEXANDRIA, VA 22313-1450**

**[PROPOSED] RESPONSE TO OFFICE ACTION**

**(37 C.F.R. § 1.111)**

The First and Non-Final Office Action dated April 8, 2003 on Applicant's above identified Patent Application (hereafter "the '038 Application") is hereby acknowledged. Please amend the '038 Application as follows.

- 1 -

RESPONSE TO AND AMENDMENT AFTER FIRST AND NON-FINAL OFFICE ACTION

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## **AMENDMENT TO THE SPECIFICATION**

**Please amend the second paragraph on page 13 as follows:**

The present invention wave energy conversion system **100** also include a turbine device **140** attached to the float **110** (or tether **120**) for generating electricity as the float **110** moves through the water.

**Please amend the third paragraph on page 14 as follows:**

The embodiment shown in Figure 3A utilizes a horizontal axis turbine **142** and an electric generator **148** affixed to the tether **120** immediately beneath the float **110**. The entire turbine **142** is free to rotate around a vertical axis so that it can adjust to the shifting directions of the float motion for driving the electric generator **148**.

**Please amend the fifth paragraph on page 14 as follows:**

Another embodiment utilizing a vertical axis turbine **146** is shown in Figure 3C. In this embodiment a 3-cup rotor is placed on a vertical axis, above or below the float **110**, and affixed to an electric generator **148**.

**Please amend the second paragraph on page 16 as follows:**

Referring to Figures 5A and 5B, there are shown two alternative embodiments of the present invention system for shallower water. In the embodiment shown in Figure 5A, the tether **120** is moored to the ocean floor **20** by moorings **132** and **134** at its two opposite ends. The float **110** is affixed to the tether **120** by one or more rollers **170** that allow the float **110** to oscillate horizontally ~~in the direction of wave travel~~. Because the float **110** moves with respect to the tether **120**, it offers a new way of generating electricity by coupling

to the rotation of the rollers 170. An additional option is to place fixed magnets (not shown) on either the float 110 or the tether 120 and use the other member as a linear generator.

**Please amend the second full paragraph on page 17 as follows:**

As shown in Figure 6, if a deep water installation is desired, it can be accomplished by having the tether branch out below a certain depth to connect to the ocean floor 20 in multiple mooring locations 130 so that the branching point will be held stationary despite the horizontal excursions of the float 110. This geometry also affords the opportunity to adjust the effective tether length by adjusting the depth at which the multiple tethers join into a combined tether. One mechanism that binds the tethers 120 together may be a moveable "collar" ~~142~~ 122, which can be adjusted, by moving it up or down to change the distance between the float and the tether joining point, to "tune" the entire installation to an ideal geometry depending on changes in the ocean wave characteristics.

**Please amend the last paragraph on page 17 as follows:**

"Tuning" of the installation can also be achieved by other means besides moving the collar on the multi-tether installation. As an example shown in Figure 7, tuning can be achieved by any suitable device, such as an electronic winch 112 powered by an on-board battery 114 through electrical cables 116, that can adjust the length of the tether 120 beneath the float 100.

**Please amend the first paragraph on page 18 as follows:**

In some applications it may be desirable to extract wave energy far from shore or in extremely deep water. In these applications it may be impractical to moor the installation to the ocean floor. Nonetheless, the principle of the oscillating float can still be employed by using a counterbalance to act as a virtual

mooring and offset the excess buoyancy of the float 110. Referring to Figure 8A, there is shown an example of this modification. The counterweight 190 at the bottom of the tether 120 stays relatively stationary due to its inertia. An underwater cable 150 connects the turbine 140 to a receiving vessel 200. In addition, the counterweight 190 will be at a depth below most of the wave influence and therefore can be stabilized with added fins or some other drag producing device.

**Please add a second paragraph on page 18 as follows:**

Of course the applications for the float-tether-counterweight configuration are not limited to power generation. Referring to Figure 8B, if the float 110 and the counterweight 190 at the bottom of the tether 120 are designed with an asymmetric drag coefficient (i.e., the body has more drag when moving in one direction than moving in the reverse direction), then the entire device will oscillate and tend to migrate horizontally through the water. Hence such a device may be used to tow a vessel 200 using a structural cable 124, or used simply as a way to move the device to a desired location.

## AMENDMENT TO THE CLAIMS

### **Claim 1 (currently amended):**

An apparatus for extracting energy from waves in a liquid body, comprising:

- a. at least one ~~floating~~ device placed in said liquid body and having a float with excess buoyancy exerting a primarily upward buoyant force on the float along a direction perpendicular to the isobaric surfaces of the liquid body which changes as said waves propagating through the liquid body;
- b. the at least one ~~floating~~ device further having means for holding said float with excessive buoyancy in said liquid body beneath the surface of the liquid body, the holding means exerting a primarily downward holding force on said float while allowing said float to move back and forth in a substantially horizontal direction as a result of a substantially horizontal force which is a combination of the holding force and said buoyant force and changes its direction back and forth in response to fluctuating pressure in the region of said float that is associated with the waves of the liquid body; and
- c. means attached to said at least one floating device, including at least one propeller driving an electric generator, for generating electricity as said float moves back and forth in said liquid body.

### **Claim 2 (original)**

The apparatus in accordance with Claim 1, wherein said holding means comprises at least one elongated flexible tether.

### **Claim 3 (original)**

The apparatus in accordance with Claim 2, wherein said at least one tether is connected to said float at one end.

**Claim 4 (original)**

The apparatus in accordance with Claim 3, wherein said holding means further comprises at least one mooring device connected to another end of said at least one tether.

**Claim 5 (original)**

The apparatus in accordance with Claim 3, wherein said holding means further comprises at least one counter-weight device connected to another end of said at least one tether.

**Claim 6 (original)**

The apparatus in accordance with Claim 2, wherein holding means further comprises a mechanism for interconnecting said float and said at least one tether that allows said float to move back and forth in a substantially horizontal direction.

**Claim 7 (currently amended)**

The apparatus in accordance with Claim 6, wherein said interconnecting mechanism comprises at least one roller pivotally connected to said float ~~and~~ wherein said at least one roller is riding on said at least one tether.

**Claim 8 (original)**

The apparatus in accordance with Claim 7, wherein said holding means further comprises at least one mooring device connected to each end of said at least one tether.

**Claim 9 (original)**

The apparatus in accordance with Claim 1, wherein said holding means comprises at least one substantially horizontal track.

**Claim 10 (original)**

The apparatus in accordance with Claim 9, wherein said holding means further comprises at least one anchoring device connected to each end of said at least one track.

**Claim 11 (original)**

The apparatus in accordance with Claim 9, wherein holding means further comprises a mechanism for interconnecting said float and said at least one track that allows said float to move back and forth in a substantially horizontal direction.

**Claim 12 (currently amended)**

The apparatus in accordance with Claim 11, wherein said interconnecting mechanism comprises at least one roller pivotally connected to said float and wherein said at least one roller is riding on said at least one track.

**Claim 13 (currently amended)**

The apparatus in accordance with Claim 2, further comprising means for adjusting the ~~tension on~~ length of said at least one tether.

**Claim 14 (original)**

The apparatus in accordance with Claim 13, wherein said adjusting means comprises a winch attached to said float.

**Claim 15 (original)**

The apparatus in accordance with Claim 13, wherein said winch is an electric winch.



**Claim 16 (original)**

The apparatus in accordance with Claim 1, wherein said holding means comprises a multiplicity of elongated flexible tethers.

**Claim 17 (original)**

The apparatus in accordance with Claim 16, wherein said holding means further comprises at least one mooring device connected to each one of said multiplicity of tethers.

**Claim 18 (original)**

The apparatus in accordance with Claim 16, further comprising means for joining said multiplicity of tethers at a distance below said float.

**Claim 19 (original)**

The apparatus in accordance with Claim 18, wherein said joining means comprises at least one movable collar device.

**Claim 20 (original)**

The apparatus in accordance with Claim 18, further comprising means for adjusting said distance below said float.

**Claim 21 (original)**

The apparatus in accordance with Claim 20, wherein said adjusting ~~mens~~ means comprises at least one powered collar device.

**Claim 22 (original)**

The apparatus in accordance with Claim 1, wherein said means for generating electricity is attached to said float.

**Claim 23 (original)**

The apparatus in accordance with Claim 2, wherein said means for generating electricity is attached to said at least one tether at a location adjacent to said float.

**Claim 24 (original)**

The apparatus in accordance with Claim 1, wherein said means for generating electricity comprises at least one turbine device.

**Claim 25 (original)**

The apparatus in accordance with Claim 24, wherein said at least one turbine device is a horizontal axis turbine device.

**Claim 26 (original)**

The apparatus in accordance with Claim 24, wherein said at least one turbine device is a vertical axis turbine device.

**Claim 27 (original)**

The apparatus in accordance with Claim 1, further comprising means for transporting electricity generated by said electricity generating means to a power processing facility.

**Claim 28 (original)**

The apparatus in accordance with Claim 1, wherein said electricity transporting means comprises at least one electrically conductive cable device.

**Claim 29 (currently amended):**

A method of extracting energy from waves in a liquid body, comprising the steps of:

- a. placing at least one ~~floating~~ device having a float with excess buoyancy in said liquid body such that the excess buoyancy exerts a primarily upward buoyant force on the float along a direction perpendicular to the isobaric surfaces of the liquid body which changes as said waves propagating through the ~~water~~ liquid body;
- b. holding said float with excessive buoyancy in said liquid body beneath the surface of the liquid body such that a primarily downward holding force is also exerted on said float, while allowing said float to move back and forth in a substantially horizontal direction, as a result of a substantially horizontal force which is a combination of the holding force and said buoyant force and changes its direction back and forth in response to fluctuating pressure in the region of said float that is associated with the waves of the liquid body; and
- c. attaching an electricity generating means to said at least one ~~floating~~ device, including at least one propeller driving an electric generator, for generating electricity as said float moves back and forth in said liquid body.

**Claim 30 (original)**

The method in accordance with Claim 29, wherein said holding step further comprises a step of attaching at least one elongated flexible tether to said float.

**Claim 31 (original)**

The method in accordance with Claim 30, wherein said holding step further comprises a step of mooring said at least one elongated flexible tether attached to said float.

**Claim 32 (original)**

The method in accordance with Claim 30, wherein said holding step further comprises a step of attaching a counter-weight to said at least one elongated flexible tether.

**Claim 33 (original)**

The method in accordance with Claim 30, wherein holding step further comprises a step of interconnecting said float and said at least one tether that allows said float to move back and forth in a substantially horizontal direction.

**Claim 34 (original)**

The apparatus in accordance with Claim 29, wherein said holding step further comprises a step of supporting said float with at least one substantially horizontal track that allows said float to move back and forth in a substantially horizontal direction.

**Claim 35 (currently amended)**

The method in accordance with Claim 30, further comprising a step of adjusting the ~~tension on~~ length of said at least one tether.

**Claim 36 (original)**

The method in accordance with Claim 29, wherein said holding step further comprises a step of attaching a multiplicity of elongated flexible tethers to said float.

**Claim 37 (original)**

The method in accordance with Claim 36, wherein said holding step further comprises the step of mooring each one of said multiplicity of tethers.

**Claim 38 (original)**

The method in accordance with Claim 36, further comprising a step of joining said multiplicity of tethers at a distance below said float.

**Claim 39 (original)**

The method in accordance with Claim 38, further comprising a step of adjusting said distance below said float.

**Claim 40 (original but miss numbered as Claim 39)**

The method in accordance with Claim 29, further comprising a step of providing a power processing facility for conditioning and storage of electricity generated by said electricity generating means.

**Claim 41 (currently amended, originally missed numbered as Claim 40)**

The method in accordance with Claim 39 40, further comprising a step of transporting electricity generated by said electricity generating means to said power processing facility.

REMARKS

1  
2  
3 1. This Response to and Amendment After First and Non-Final Office  
4 Action made under 37 C.F.R. § 1.111 (hereafter "the Amendment") is being mailed  
5 by United States Express Mail, Express Mail Label No. \_\_\_\_\_ in  
6 a postage paid envelope addressed to Mail Stop Fee Amendment, Commissioner  
7 for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August \_\_, 2003.  
8

9 2. The shortened statutory period of three (3) months time period for  
10 response to the First Office Action expired on July 8, 2003. The Applicant has  
11 enclosed with this Amendment a Petition and Fee Extension of Time under  
12 37 C.F.R. § 1.136 to request an extension of time of two (2) month through  
13 September 8, 2003 for this Amendment to be timely filed. Accordingly, this  
14 Amendment is timely filed. In the event that the Commissioner for Patents should  
15 determine that any additional extension of time is required for this Amendment to  
16 be timely filed and an appropriate fee is due for that extension of time, then the  
17 Commissioner for Patents is hereby authorized to charge Deposit Account  
18 Number 18-2222 for such appropriate fee.  
19

20 3. In this Amendment, independent Claims 1 and 29 have been amended,  
21 and dependent Claims 2 through 28 and 30 through 41 are retained as they were  
22 originally presented. The original '038 Application had forty-one (41) total claims  
23 wherein two (2) were independent claims. The '038 Application now has the same  
24 number of total claims and the same number of independent claims. Accordingly,  
25 no additional filing fee is due. In the event that the Commissioner for Patents  
26 should determine that any additional fee is due, then the Commissioner for Patents  
27 is hereby authorized to charge Deposit Account Number 18-2222 for the  
28 appropriate fee.

1           4.     The Examiner's objection to the drawings is noted. The Examiner's  
2 careful review of the drawing and the Specification is appreciated. Appropriate  
3 amendments have been made to the drawings and related paragraphs of the  
4 Specification of the '038 Application in order to overcome the objection.

5  
6           4.1    The Examiner's objections to the drawings concerning missing  
7 reference numerals are addressed as follows:

8  
9           4.1.1 *Figure 1, reference 140:*

10                   The second paragraph on page 13 of the  
11 Specification has been amended to recite "a turbine  
12 device 140" shown in Figure 1.

13  
14           4.1.2 *Figure 3A, reference 142:*

15                   In the original text of the third paragraph on page  
16 14 of the Specification, "turbine **142**" was recited.

17  
18           4.1.3 *Figure 4B, reference 162:*

19                   The reference numeral **162** and the antenna shaped  
20 drawing element pointed by reference numeral **162** in  
21 Figure 4B are both deleted therefrom. A sheet of  
22 drawings containing Figure 4B with proposed drawing  
23 correction is submitted, along with a Request for  
24 Approval of Drawing Correction concurrently filed  
25 herewith.

26  
27           4.1.4 *Figure 5A, references 130, 132 and 134:*

28                   The second paragraph on page 16 of the

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1 Specification has been amended to recite that "in Figure  
2 5A, the tether **120** is moored to the ocean floor **20**  
3 by moorings **132** and **134** at its two opposite ends" as  
4 originally shown in Figure 5A. The reference numeral  
5 **130** in both Figures 5A and 5B has been corrected to  
6 reference numeral **20** which points to the ocean floor.  
7 The duplicate reference numeral **120** at the far right end  
8 of Figure 5A is deleted. A sheet of drawings containing  
9 Figures 5A and 5B with proposed drawing correction is  
10 submitted, along with the Request for Approval of  
11 Drawing Correction concurrently filed herewith.

12  
13 4.1.5 *Figure 6, reference 122:*

14 The second full paragraph on page 17 of the  
15 Specification has been amended to recite "a moveable  
16 'collar' **122**" shown in Figure 6.

17  
18 4.1.6 *Figure 6, references 114 and 116:*

19 The last paragraph on page 17 of the Specification  
20 has been amended to recite "an electronic winch **112**  
21 powered by an on-board battery **114** through electrical  
22 cables **116**" as shown in Figure 7.

23  
24 4.1.7 *Figures 8A and 8B, references 124, 140, 150, 190 and*  
25 *200:*

26 Due to a printing error, page 18 of the copy of the  
27 Specification submitted when the '038 Application was  
28 filed missed the remaining texts of the first paragraph on



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1 page 18 after the word "however", and also missed the  
2 entire second paragraph on page 18. These missing texts  
3 are being added back through this Amendment, which  
4 recited the turbine **140**, the cable **150**, the counterweight  
5 **190** and the vessel **200** shown in Figure 8A, and the  
6 structural cable **124** and the counterweight **190** shown in  
7 Figure 8B.

8  
9 4.2 The Examiner's Objection to the drawings concerning reference  
10 **130** in Figures 5A and 5B is addressed as follows:

11 Reference numeral **130** in both Figures 5A and 5B has  
12 been corrected to **20** which points to the ocean floor. A sheet of  
13 drawings containing Figures 5A and 5B with proposed drawing  
14 correction is submitted, along with the Request for Approval of  
15 Drawing Correction concurrently filed herewith.

16  
17 4.3 The Examiner's objections to the drawings concerning the  
18 showing of the electric generating means and the counterweight  
19 are addressed as follows:

20 Figure 3A and the corresponding third paragraph on page  
21 14 of the Specification have been amended to show the electric  
22 generator **148** attached to the tether **120**. Figure 3C and the  
23 corresponding fifth paragraph on page 14 of the Specification  
24 have been amended to show the electric generator **148** attached  
25 to the float **110**. No new matter is introduced. A sheet of  
26 drawings containing Figures 3A and 3C with proposed drawing  
27 correction is submitted, along with the Request for Approval of  
28 Drawing Correction concurrently filed herewith. The

1 counterweight 190 connected to the lower end of the tether 120  
2 was shown in original Figures 8A and 8B.

3  
4 4.4 The Examiner's objection to the drawings concerning  
5 duplicated reference 142 is addressed as follows:

6 The second full paragraph on page 17 of the  
7 Specification has been amended to recite "a moveable 'collar'  
8 122" shown in Figure 6.

9  
10 4.5 It is believed that the amendment and response presented herein  
11 have overcome the objection to the drawings.

12  
13 5. The Examiner's rejection of Claims 1-41 under 35 U.S.C. § 112, first  
14 paragraph, is noted. The Examiner's careful reading of the Specification is  
15 appreciated. The Applicants respond to the Examiner's concern as follows:

16  
17 5.1 The Examiner's rejection concerning the horizontal movement  
18 of the float as described in the Specification is addressed as  
19 follows:

20  
21 5.1.1 The Applicants respectfully point out that Figure 1 of the  
22 drawing did not show that the float would only move  
23 vertically. Rather, Figure 1 of the drawing shows that the  
24 buoyancy of the float 110 creates a force **B** which is  
25 perpendicular to the isobaric surfaces 16; that the tether  
26 120 also exert a force **T** on the float 110 along the  
27 downward direction of the tether 120; and that the  
28 resultant force **F** from the combined influence of the

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1 buoyancy force **B** and the tether force **T**. Figures 2A  
2 through 2D further show that the resultant force **F**  
3 fluctuates with the wave and tether geometries and drives  
4 the float **110** back and forth as the slope of the isobaric  
5 surfaces **16** change, which occurs as waves cross over the  
6 region where the system is moored.

7  
8 5.1.2 In the second paragraph on page 16, the texts “in the  
9 direction of wave travel” have been deleted. The reason  
10 that the float can move back and forth is because the  
11 resultant force **F** changes its direction with the wave and  
12 tether geometries as the slope of the isobaric surfaces **16**  
13 change, which occurs as waves cross over the region  
14 where the system is moored.

15  
16 5.2 The Examiner’s rejection concerning the “tuning” of the  
17 “natural frequency” of the system as described in the  
18 Specification is addressed as follows:

19 The term “natural frequency” as used in the Specification  
20 refers to the frequency of back and forth oscillation of the float,  
21 which can be adjusted by changing the position of the collar  
22 **122** which in turn changes the distance between the float **110**  
23 and the tether joining point. The winch for adjusting the length  
24 of the tether **120** may be controlled manually or by automated  
25 programs.

26  
27 5.3 The Examiner’s rejection concerning how the electricity is  
28 generated as described in the Specification is addressed as

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1 follows:

2 The Specification has described using turbines and  
3 electric generators for generating electricity. It is known that  
4 electricity can be generated by an electric generator when it is  
5 driven by the rotation of the turbine propellers attached to the  
6 electric generator. The purpose of Figure 8A is to show that in  
7 some applications it may be desirable to extract wave energy far  
8 from shore or in extremely deep water, but it may be  
9 impractical to moor the installation to the ocean floor; that the  
10 principle of the oscillating float can still be employed by using  
11 a counterbalance to act as a virtual mooring and offset the  
12 excess buoyancy of the float 110. The purpose of Figure 8B is  
13 to show that the applications for the float-tether-counterweight  
14 configuration is not limited to electrical power generation.

15  
16 5.4 It is believed that the amendment and response presented herein  
17 have overcome the rejection of Claims 1-41 under  
18 35 U.S.C. § 112, first paragraph, and therefore these claims are  
19 allowable. Accordingly, reconsideration and withdrawal of the  
20 rejection of Claims 1-41 under 35 U.S.C. § 112, first  
21 paragraph, are respectfully requested.

22  
23 6. The Examiner's rejection of Claims 1-41 under 35 U.S.C. § 112,  
24 second paragraph, is noted. The Examiner's careful reviewing of the claims is  
25 appreciated. The Applicants respond to the Examiner's concern as follows:

26  
27 6.1 In Claim 1, the phrase "at least one floating device" has been  
28 amended to "at least one device" which includes the float 110

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1 and a holding means (the holding means may further include  
2 the tether 120 and the mooring 130).

3  
4 6.2 Claim 6 has been amended to recite that the float moves back  
5 and forth in a substantially horizontal direction "as a result of  
6 said substantially horizontal force and in response to said  
7 fluctuating horizontal pressure gradients associated with said  
8 waves of said liquid body".

9  
10 6.3 Claims 12 has been amended to recite that it is the roller that is  
11 riding on the at least one track.

12  
13 6.4 In Claim 21, the mis-spelled word "mens" has been corrected to  
14 "means".

15  
16 6.5 Claim 22 depends on Claim 1 and recites the phrase "means for  
17 generating electricity". Claim 1 has been amended to recite that  
18 the means for generating electricity comprises "at least one  
19 propcller driving an electric generator".

20  
21 6.6 It is believed that the amendment and response presented herein  
22 have overcome the rejection of Claims 1-41 under  
23 35 U.S.C. § 112, second paragraph, and therefore these claims  
24 are allowable. Accordingly, reconsideration and withdrawal of  
25 the rejection of Claims 1-41 under 35 U.S.C. § 112, second  
26 paragraph, are respectfully requested.  
27  
28

1           7.     The Examiner's rejection of Claims 1-4, 22, 27-31, 40 and 41 under  
2 35 U.S.C. § 102(b) over United States Patent No. 4,581,704 issued to Rubi  
3 (hereafter "*Rubi*") is noted but respectfully traversed.  
4

5           7.1    *Rubi* disclosed a wave action electricity generation system **100**  
6 which includes a floating platform **101** that supports the system  
7 components in the surface of a body of water. According to  
8 *Rubi*, the system is allowed to freely float (as indicated by  
9 arrow **A1** in Figure 1) and rotate (as indicated by arrow **A2** in  
10 Figure 1) of the float on the surface of the body of water, and  
11 the wave motion causes a lifting on portion **102** of the platform  
12 (as indicated by arrow **A3** in Figure 3) or rotation of swivel  
13 means **206** (as indicated by arrow **A4** in Figure 3), which in  
14 turn causes the movement of the mechanical components of the  
15 system for electric generation.  
16

17           7.2    The present invention disclosed and claimed in the '038  
18 Application is totally different from the teaching of *Rubi* as it  
19 operates upon a complete different principle. Rather than being  
20 driven by the motion of the water in the waves, the present  
21 invention device is driven by the pressure fluctuations under the  
22 surface of the water body. The present invention uses a float  
23 with excessive buoyancy tethered to the ocean floor by a tether  
24 that keeps the float beneath the ocean surface in spite of the  
25 excessive buoyancy. It also allows the float to move  
26 substantially horizontally in response to fluctuations in pressure  
27 in the region of the float. The buoyancy of the float creates  
28 a force **B** perpendicular to the isobaric surfaces of the ocean

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1 wave, while the tether creates a primarily downward holding  
2 force T on the float. As a result, the float is subject to  
3 a substantially horizontal force F which is a combination of the  
4 holding force T and the buoyant force B. As the direction of  
5 the substantially horizontal force F changes back and forth in  
6 response to fluctuating pressure in the region of the float (which  
7 pressure fluctuation is associated with the waves of the water  
8 body, as slope of the isobaric surfaces changes which occurs  
9 when the ocean waves pass over the region where the float is  
10 moored), the float moves back and forth beneath the surface of  
11 the water, as shown in Figures 2A through 2D of the drawings  
12 of the '038 Application.

13  
14 7.3 These novel and unique characteristics and features of the  
15 present invention is discussed in detail in the Specification of  
16 the '038 Application, and further explicitly claimed in amended  
17 independent Claims 1 and 29 of the '038 Application.  
18 Particularly, amended Claims 1 and 29 of the '038 Application  
19 now claim that the float with excessive buoyancy is held in the  
20 water body *beneath the surface of the liquid body* and moves  
21 back and forth in a substantially horizontal direction as a result  
22 of a substantially horizontal force, which is a combination of  
23 the holding force and the buoyant force *and changes its*  
24 *direction back and forth in response to fluctuating pressure in*  
25 *the region of the float that is associated with the waves of the*  
26 *water body*. This is totally different from the teaching of *Rubi*  
27 where the system is floating on the surface of the water and its  
28 movement has nothing to do with underwater pressure change.

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7.4 It is therefore believed that the amended independent Claims 1 and 29 are not anticipated by *Rubi*, and consequently are allowable under 35 U.S.C. § 102(e) over *Rubi*. Claims 2–4, 22, 27 and 28 depend on independent Claims 1, and Claims 30, 31, 40 and 41 depend on independent Claims 29, respectively, and accordingly they are also believed to be allowable under 35 U.S.C. § 102(e) over *Rubi*.

8. The Examiner's rejection of Claims 16–21, 26 and 36–39 under 35 U.S.C. § 103 over *Rubi* in view of United States Patent No. 4,327,296 issued to Weyers (hereafter "*Weyers*") is noted but respectfully traversed.

8.1 Neither *Rubi* nor *Weyers* has disclosed the present invention wave energy conversion device that utilizes a float with excessive buoyancy and held in the water body beneath the surface of the liquid body where the movement of the float is caused by the pressure fluctuations under the surface of the water body. Accordingly, independent Claims 1 and 29 are allowable over *Rubi* in view of *Weyers*.

8.2 Claims 16–21, 26 and 36–39 depend on allowable independent Claims 1 and 29 respectively, and consequently are also allowable under 35 U.S.C. § 103(a) over *Rubi* in view of *Weyers*.

9. The Examiner's rejection of Claims 5, 6–12 and 32–34 under 35 U.S.C. § 103 over *Rubi* in view of United States Patent No. 4,754,157 issued to Windle (hereafter "*Windle*") is noted but respectfully traversed.



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1 9.1 Neither *Rubi* nor *Windle* has disclosed the present invention  
2 wave energy conversion device that utilizes a float with  
3 excessive buoyancy and held in the water body beneath the  
4 surface of the liquid body where the movement of the float is  
5 caused by the pressure fluctuations under the surface of the  
6 water body. Accordingly, independent Claims 1 and 29 are  
7 allowable over *Rubi* in view of *Windle*.

8  
9 9.2 Claims 5, 6-12 and 32-34 depend on allowable independent  
10 Claims 1 and 29 respectively, and consequently are also  
11 allowable under 35 U.S.C. § 103(a) over *Rubi* in view of  
12 *Windle*.

13  
14 10. The Examiner's rejection of Claims 13-15, 23-25 and 35 under  
15 35 U.S.C. § 103 over *Rubi* in view of United States Patent No. 6,531,788 issued to  
16 Robson (hereafter "*Robson*") is noted but respectfully traversed.

17  
18 10.1 Neither *Rubi* nor *Robson* has disclosed the present invention  
19 wave energy conversion device that utilizes a float with  
20 excessive buoyancy and held in the water body beneath the  
21 surface of the liquid body where the movement of the float is  
22 caused by the pressure fluctuations under the surface of the  
23 water body. Accordingly, independent Claims 1 and 29 are  
24 allowable over *Rubi* in view of *Robson*.

25  
26 10.2 Claims 13-15, 23-25 and 35 depend on allowable independent  
27 Claims 1 and 29 respectively, and consequently are allowable  
28 under 35 U.S.C. § 103(a) over *Rubi* in view of *Robson*.

11. For the reasons stated above, it is submitted that all pending Claims 1-41 of the '038 Application are allowable either under 35 U.S.C. § 102(b) over *Rubi* or under 35 U.S.C. § 103(a) over *Rubi* in view of *Weyers*, *Windle* or *Robson*. Accordingly, reconsideration and withdrawal of the rejection of these pending Claims 1-41 under either 35 U.S.C. § 102(e) over *Rubi* or 35 U.S.C. § 103(a) over *Rubi* in view of *Weyers*, *Windle* or *Robson* are respectfully requested, and issuance of a Notice Of Allowance of all pending claims of the '038 Application is respectfully solicited.

Respectfully submitted,

Date: \_\_\_\_\_

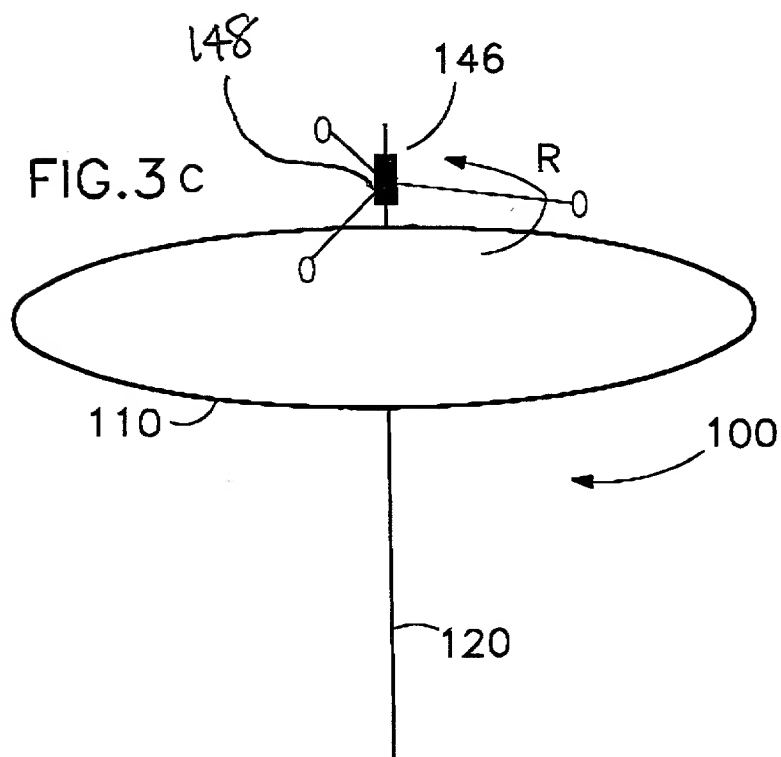
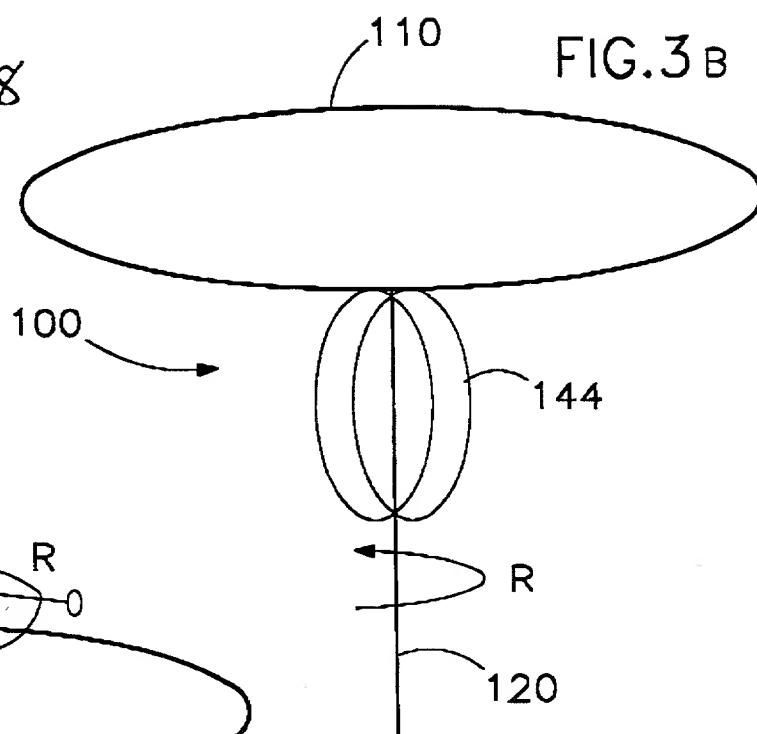
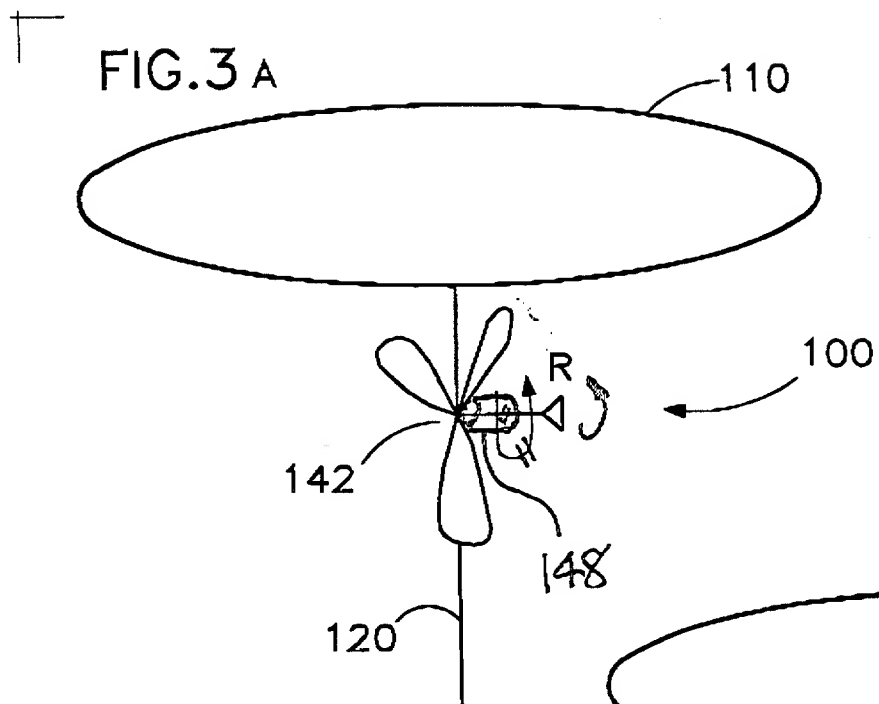
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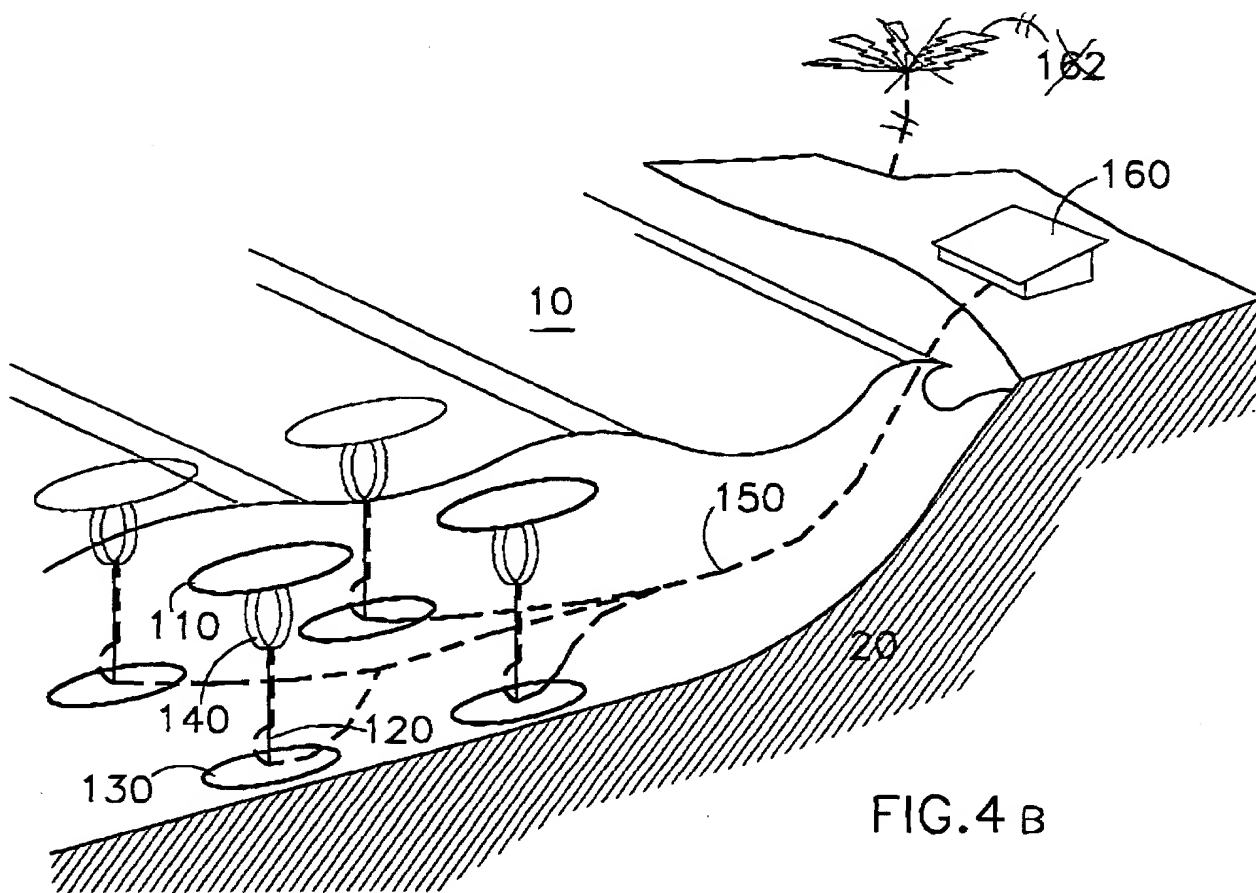
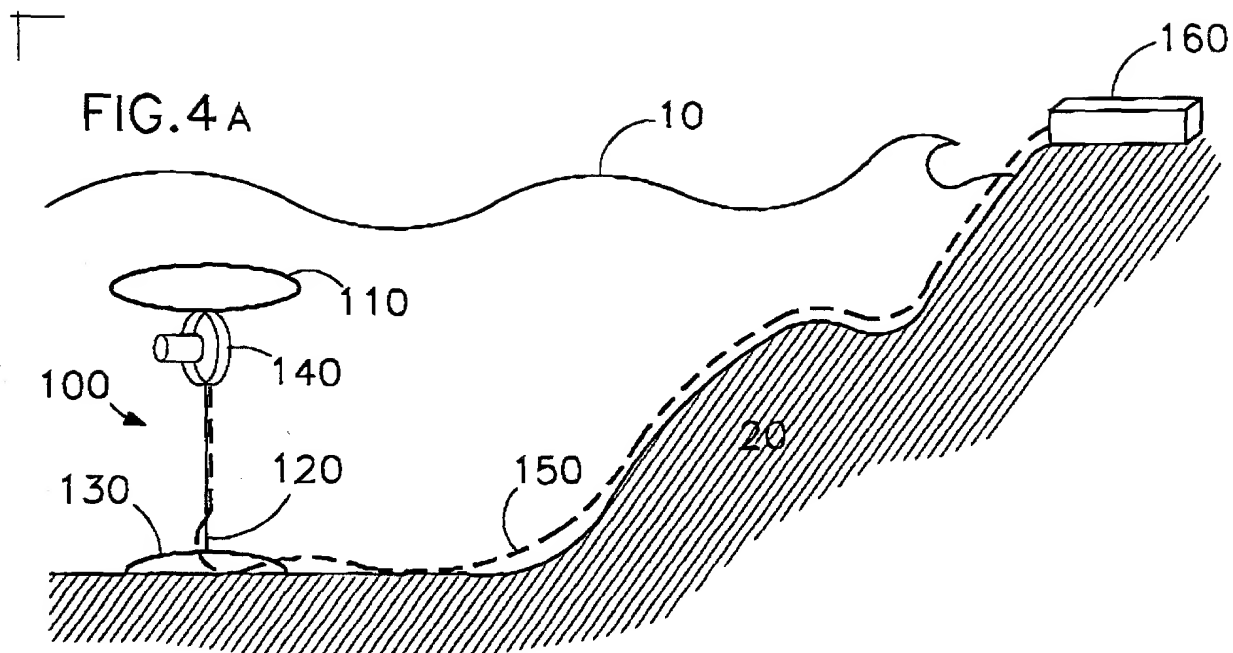


FIG. 5A

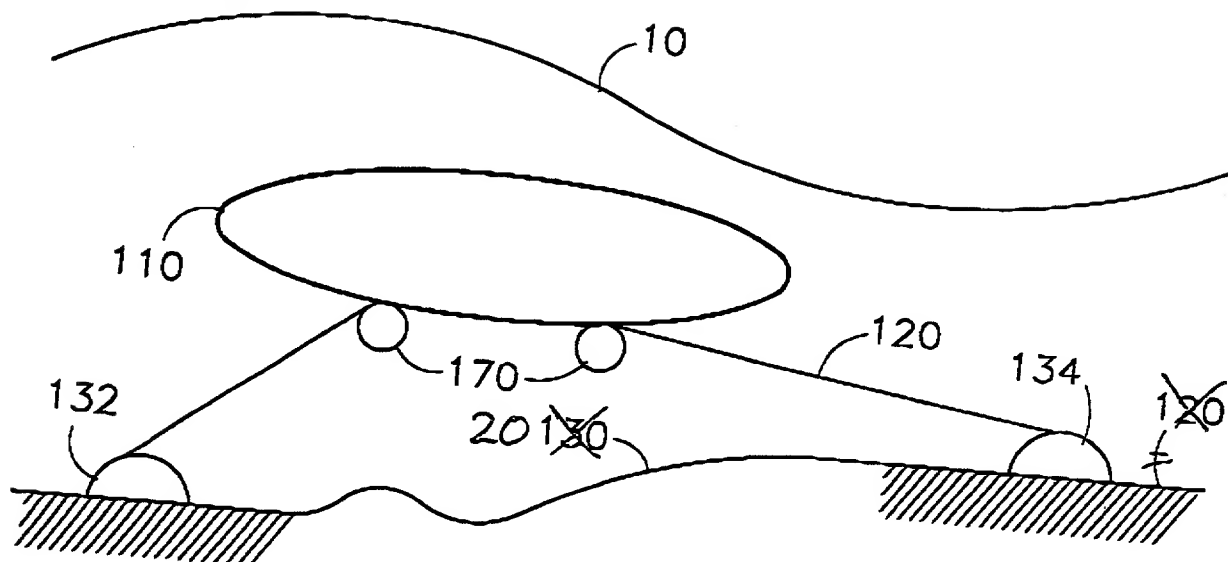


FIG. 5B

